authorized in interagency agreements. These include Federal agencies, the Master Mutual Aid Agreement, and local fire control agencies through mutual aid and cooperative agreements, in the form of mutual threat zones, with all of the city and county fire departments within the five counties. These cooperative efforts of the fire service providers comprise the entire fire protection delivery system within Santa Clara Unit.

Level Of Service Rating

The legislature has charged the Board of Forestry and CDF with delivering a fire protection system that provides an equal level of protection to lands of similar type (PRC 4130). To do this, CDF needs an analysis process that will define a level of service rating that can be applied to the wildland areas in California to compare to the level of fire protection being provided. The rating is expressed as the percentage of fires that are successfully attacked. Success is defined as those fires that are controlled before unacceptable damage and cost are incurred.

California has a complex fire environment and CDF data on assets at risk to damage from wildfire is incomplete. These factors combine to make it very difficult to develop a true performance-based fire protection planning system. CDF has resorted to prescription-based fire protection planning (travel times of firefighting resources to incidents, report times for the detection system, the same acreage goal statewide, etc.) as a way to overcome the complexity of the issues. Prescription-based planning is possible but tends to oversimplify some issues. Prescription standards also make it difficult to integrate the interrelationships of various fire protection programs, such as the value of fuel-reduction programs in reducing the level of fire protection effort required.

The following approximation method is proposed to overcome these shortcomings and allow the unit to proceed with a damage-plus-cost analysis of fire protection performance. This is a relative system, attempting to measure the relative impact of fire on the various assets at risk. At the same time, this process produces a level of service rating (LOS). The rating can be used to describe fire protection services to “civilian stakeholders”. The level of service rating also provides a way to integrate the contribution of various program components (fire prevention, fuels management, engineering and suppression) toward the goal of keeping damage and cost within acceptable limits. It is important to reiterate that this system is relative system and that the ratings are only approximations. In this system, a fire may be considered a failure based on the firefighting resource draw and size of fire, however, the final fire size and assets protected may have been a true success based on firefighting activities in extreme fire weather conditions.

The Level of Service (LOS) rating is a ratio of successful fire suppression efforts to the total fire starts, a method to measure initial attack success and failure rates throughout the Unit and is based on fire sizes. The LOS uses a Geographic Information System (GIS) that overlays a 20-year history of wildfires onto a map and derives the average annual number of fires by size, severity of burning and assets lost from data entered in the Departments Emergency Activity Reporting System. This data provides a LOS rating, in terms of a success and failure calculation.

Success Rate equals the annual number of fires extinguished by initial attack (relatively small sized) divided by the total number of fires. If all the fires in a given fuel type are extinguished in small acreages that is considered a 100% success rate for that fuel type (planning Belt)

The result is an initial attack success rate in percentage of fires by vegetation type and area. Success is defined as those fires that are controlled before unacceptable damage and cost are incurred and where initial attack resources are sufficient to control wildfires.

The Fire Plan Ignition Workload Assessment map is designed to show effectiveness of the suppression organization in meeting the initial attack fire workload. The attempt at controlling fires

before they become large and costly is evaluated in this assessment. The underlying assumption is that fires, successfully contained in the initial attack stages, are not the primary problem. Problem fires are the few that are costly to control or exceed suppression organization capabilities and cause damage.

Fires are grouped into "success" and "failure" categories based on various factors. The assessment groups fires by general vegetation or fuel types (planning belts). Within the fuel type, fires are further classified based on final fire size and weather conditions at the time of ignition. Each fire is classified and labeled as either a successful initial attack or a failure.

The initial attack workload assessment is displayed in the maps below and statistical data related to these maps. Initial attack points of origin are plotted and color-coded based on success/failure scores. Some of the successes and failures are not matched with weather readings and are shown on this analysis. Further validation will be conducted to match weather with the ignitions in the future. The workload can be summarized in the Quad 81st grid. Results can also be summarized into a percentage success score and displayed by Quad 81st grid. Combining fire business workload patterns with aggregated assets at risk can be useful in defining target areas for focusing Pre-fire Management project efforts.

Initial Attack Success and Failures

Analyses time period includes January 1981 through December of 2003. The following planning belt vegetation types were analyzed.

Planning Belt	Success Rate	Successful I.A.	I.A. Failure
Coastal Conifer	100%	71	0
Woodland	93%	63	5
Grass	93%	1358	104
Interior Conifer	91%	144	10
Brush	79%	27	7
Unclassified	94%	611	36

Because of changes in the GIS mapping software, better data entry, changes in the fuels layers and severe weather reporting stations and other problems were identified during last years writing and data collection of this document changes were made in those areas and the Initial Attack Success / Failure matrix is.

Fuels

The fuels assessment layer is valuable for explaining much of the local situation. This layer can help focus attention on solutions.

The fuels assessment considers current flammability of wildland fuels, given location on the slope, average bad weather conditions, ladder fuels, and crown density.

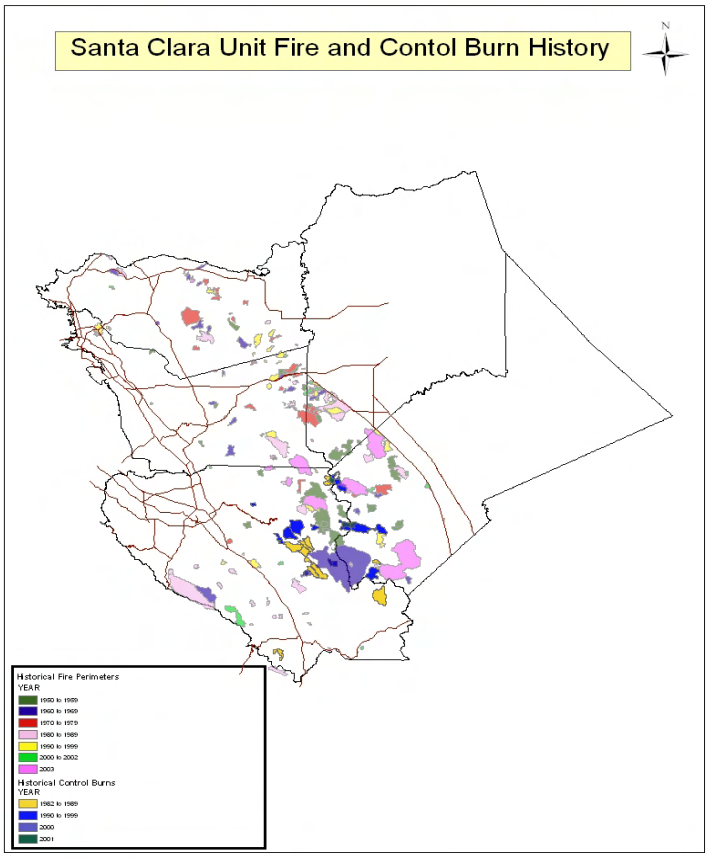
Fuel, in the context of wildland fire, refers to all combustible material available to burn on an area of land. Grass, brush and timber are the most common fuels found in our mountain ecosystem.

Hazardous Fuels Assessment

Arrangement is critical in wildland fire behavior, for it dictates how a fire spreads. Un-compacted fuels, such as grass, spread fire rapidly since more of its surface can be heated at one time. Compacted fuels, such as pine litter, burn slower because heat and air only reaches the top of the fuel. Vertical arrangement refers to a fuel's ability to spread upward into treetops. These are called ladder fuels and are influential factors on fire spread. The ignition of ladder fuels allows the fire to spread from the ground into the treetops. Crown or canopy refers to the tops of trees and is very important in stands of burning timber. A fire once introduced by ladder fuels to the tops of dry conifers can spread as rapidly as a grass fire from treetop to treetop.

The current fuels layer is a product of a GIS mapping project and a fuel survey and cataloging program using aerial photography and ground survey of the areas completed in the mid 1990's. While this data is still somewhat current it is need of updating. Other areas that have been identified within the fuels category are; the lack of a definitive fuel type representing housing or buildings as a fire carrying fuel type, the narrowness of the crown score rankings. When the crown score is factored into the assessments it is only for one fuel type, Interior Conifer (Pine trees), and the percentage of time when that given fuel type will promote and sustain a running crown fire. While this type of fire is very rare in the Santa Clara Unit, as well as much of the rest of the state, the fact remains that while not producing the same visual image as a running timber crown fire other fuel types also can, and do on a much more common basis, a type of crown fire. Given these facts, and the lack of money to accomplish the needed updates of

the fuels layers by the Fire and Resource Assessment Program, the unit's Pre Fire Engineer has been trying to secure a stable funding source to accomplish these goals.



Fire History

Wildfire history is a significant factor of the pre-fire management planning process. The fire plan assessment framework incorporates detailed information for determining the most beneficial locations for pre-fire management projects, an idea of the level of service on SRA for the unit and various assets at risk information. Fire history is a piece of the puzzle that allows unit personnel to learn from our past and make an attempt to prepare for future fire behavior. Having knowledge of fire history provides an account of historic fire travel in a particular area. Armed with knowledge of historic fire spreads, fire suppression forces are better equipped to predict fire spread potentials. Identifying where the largest and most damaging fires have occurred is a necessary step in preparing for future wildfire. The most significant aspect of fire history in Santa Clara Unit is that personnel are able to compare the relationship between identified assets at risk and the historic burning patterns of wildfire which allows for a more informed decision making processes when preparing fire planning documents and procedures. Below is the wildfire history for Santa Clara Unit between 1900 and 2004. The maps display significant patterns that are used in pre-fire planning process.